October 1986 Naval Aviation Safety Review V.32 #4 US NAVY

approach

“Why don't they tell us what they want?

The Big Disconnect

The fleet says the system is unresponsive. It takes years to get anything done, and there are too many forms to fill out. The system replies that the fleet isn't using the right channels. The forms aren't that hard, and if they really cared about their flight gear, they'd stop complaining and take the time to send in the paper work.

We really have a problem when it comes to flight gear, and few people seem to be happy. Flight gear is something that aviators really care about. When they start talking about it, the discussion gets very passionate and personal.

Is the fleet not talking the right language for NAVAIR to understand? NAVAIR responds to ORs, RAMECs, QDRs, Hazard Reports and ECPs. But does the fleet know how to translate its needs and complaints into these formats? Every squadron has a safety officer and parachute rigger who should be familiar with these communication tools. The people I talk to say this isn't the case.

This issue of Approach lists some solutions in "The Total Perspective" (page 26). Another solution is to simply call or write the ALSS branch (AIR-5311) (Autovon 222-3691) for guidance. These people really want to help. Messages from the fleet carry more weight than most aviators realize. The ALSS folks or your local AMSO can help you develop your gripe into a viable form.

All of the players can stand a little education in communicating their needs more effectively. AIR-5311 has already made tentative steps in that direction. During this past summer, a road team began making the rounds of the functional wings, briefing COs, XOs and wing safety officers on the current ALSS picture and the immediate future as well as fielding questions. This is a good meeting point for both sides.

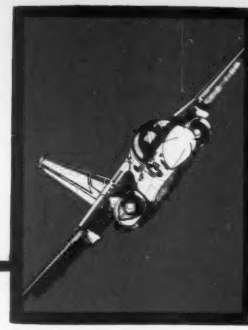
It's still going to take time to react to the fleet's desires. NAVAIR is willing to listen. Make sure that all of you out there are using the proper dialogue.

LCdr. David L. Parsons
Editor

Why don't they give us what we want?”

inside approach

Vol. 32 No. 4



Cover illustration of a S-3A Viking by Approach artist John Williams

FEATURES

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Aircrew Anti-Exposure Systems:

Wet Suit vs. Dry Suit

By Anthony Tran and Sue Reeps

When naval aircrews have to bail out into cold water, they run the risk of immersion hypothermia. Protecting them is a subject that has received *continuous* attention for more than 35 years. Concern comes not only from the users but from physiologists, researchers and those responsible for developing protective clothing systems.

The primary reason for this continual attention is because the problem of anti-exposure protection demands compromises. Constant-wear anti-exposure protection has always meant putting clothing on an aviator and achieving increased levels of protection only at the cost of some corresponding decrease in comfort or mobility. As a result most aircrews have never really liked ~~any~~ of the anti-exposure clothing provided to them.

Many users have been enthusiastic at first, and in some cases acted as proponents of new approaches. The "honeymoon" has historically been rather short. There seems a lot of variation in the amount of discomfort they are willing to endure and level of protection they want. Adding to the dilemma is the need for protective systems that are logistically supportable and maintainable.

In February 1979, CNO established an operational requirement (OR) for cold water exposure protection, which detailed requirements in terms of immersion hypothermia protection as well as in-flight performance. The OR established a requirement for a system capable of protecting personnel immersed in water with temperatures down to 45 degrees Fahrenheit for two hours immersed time without permanent physiological damage or impairment. This level of protection was to be provided without the use of a raft.

The requirement for a second stage system capable of protecting in-water temperature of 32 degrees Fahrenheit for two hours was also established. This second stage system could employ a raft. Physiological limitations were set at a minimum body temperature of 95 degrees Fahrenheit, a minimum hand temperature of 50 degrees Fahrenheit for the first stage system and 61 degrees Fahrenheit for the second stage system, and a minimum foot skin temperature of 32 degrees Fahrenheit.

In addition to exposure protection requirements, the OR required four things. The system must not support combustion. It must be compatible with existing and proposed flight and survival equipment, crew station and overall mission accomplishment. It must impose minimum physical restrictions on aircrew. And it must restrict body core temperature from heat buildup during flight to below 101.3 degrees Fahrenheit. Reliability, maintainability and logistic supportability were also directed.

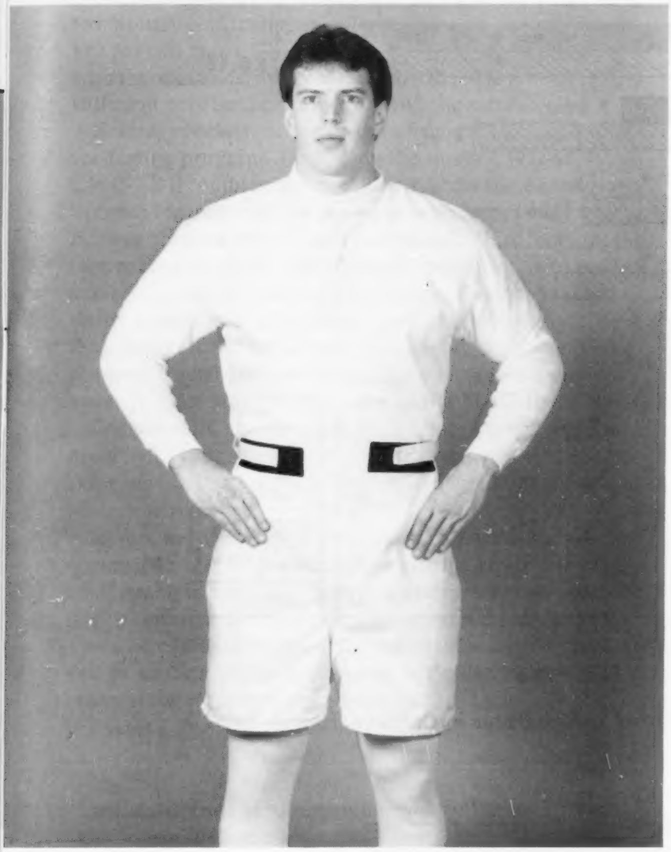
Shortly after issuance of this OR, Naval Air Development Center (NADC), the cognizant field activity for Aviation Life Support Systems (ALSS), conducted a lengthy evaluation program to identify the anti-exposure technologies and design concepts that would most closely guarantee meeting the OR. NADC evaluated garments including PTFE/Nomex laminates such as the CWU-62/P coverall; a number of wet suits (three of which were ⅛-inch thick commercial wet suits); and the CWU-21/P Egyptian cotton ventile coverall. In order

Figure 1. CWU-72/P Liner

to study the true effects of the entire assembly of flight clothing and equipment, each garment was evaluated with the MA-2 torso harness, the SV-2 survival vest with LPU life preserver, the CSU-15/P G-suit, a flight helmet, flight gloves and flight boots. Also, the subjects wore the undergarments that were specified for each configuration.

The program included evaluating the selected garments for their effects on in-flight mobility and heat stress, as well as for their respective levels of immersion hypothermia protection. As you might expect, the mobility evaluation phase indicated that mobility reduction was not a function of general suit type but rather of each suit's design. Heat stress test runs were conducted for a maximum of three hours in a thermal chamber maintained at a temperature of 95 degrees Fahrenheit. The task sequence during the runs included psychomotor, tracking tasks, physical work tasks and rest in order to simulate the various activities typical of ejection seat, fixed seat and mobile crewmen. Generally, *the wet suits evoked more pronounced heat stress* responses than the remainder of the suits tested. Tests of less than three hours were terminated for subjective sensations of heat discomfort rather than for reasons of attaining critical physiological end points. However, wet suits cause rates of total weight loss (as much as 1.3 pounds per hour in some runs) that would be expected to compromise aircrew physiological well-being during a three-hour exposure. In addition, the rate of core temperature rise would have been expected to approach a critical level of 102.2 degrees Fahrenheit for some of the wet suits tested if the runs had lasted the full three hours. The wet suits were also less acceptable than the dry suits, as indicated by the high number of test runs terminated voluntarily in less than three hours.

Two phases of immersion hypothermia tests were conducted in accordance with the OR, in a controlled test chamber and in *still* water. The first phase was conducted in 32 degrees Fahrenheit air temperature with 15 to 20 mph winds, 45 degrees Fahrenheit water temperature and a maximum in-water immersion of two hours. The second phase was conducted in 0 degrees Fahrenheit air temperature with 15 to 20 mph winds, 32 degrees Fahrenheit water temperature and a maximum of two hours exposure. For this second phase, the exposure included 10 minutes in the water followed by 110 minutes in a raft. All of the configurations tested indicated core temperature end points well above the 95 degree Fahrenheit cutoff established by the OR, and there were no significant differences between the wet suits and dry suits for these still-water conditions. Although no specific requirement for the mean skin temperature was cited in the OR, greater drops in skin temperature decreased the wearer's comfort and mobility and had a negative phychological effect on feelings of survival potential. In general, the dry suit configurations



performed better than the wet suits in maintaining higher skin temperatures.

Due to the superior performance of dry suits under conditions of heat stress, and the generally equivalent levels of cold water protection offered by the wet suits and dry suits in still water, the decision to develop a logistically supportable *dry suit system* was recommended by NADC and endorsed by NAVAIR. Since that decision, NADC has been actively pursuing the development and introduction of that system.

The primary component of the dry suit system has already been introduced to the fleet: the CWU-62/P coverall. Made of a breathable, waterproof laminate which is fire-resistant, it provides in-flight comfort and in-water emergency protection. Another element of the system, scheduled for fleet introduction during the 86/87 winter season, is the CWU-72/P liner (figure 1). This liner, which incorporates microfiber olefin insulation ("Thinsulate") sandwiched between high temperature resistant aramid ("Nomex") layers, will replace the USAF CWU-23/P cotton liner currently in use. Due to its water repellent nature, the CWU-72/P liner will maintain a higher level of warmth when saturated with water than will the CWU-23/P.

According to Naval Safety Center data, a total of 29 percent of the aircrew who ejected from an A-6 and 14 percent of those who ejected from an EA-6B sustained outer garment damage during 1969-1984. As a result, the A-6 and EA-6B communities have expressed concern over the effectiveness of the CWU-62/P dry anti-exposure system when torn or damaged during "through-the-canopy" ejection. To assess the effects of damage to the CWU-62/P, three configurations listed below were tested at NADC.

The test results indicated that the CWU-72/P liner does indeed provide greater protection than the CWU-23/P liner under equivalent conditions in cold water. Although protection levels were degraded for both liners when wet, the loss of protection was found to be greater for the CWU-23/P than for the CWU-72/P. A higher body heat loss reflects poorer insulation qualities, which was expected for configuration 3 due to the extent of damage (see table below). The higher body heat loss for configutation 1 is probably the result of the lower insulation provided by the CWU-23/P liner materials compared with the materials of the CWU-72/P. Overall, the greatest loss of protection was observed with configuration 3, as expected. It should be noted, however, that even with substantial damage to the components of the assembly, such as with configuration 3, ***sufficient protection to meet the OR was provided by the CWU-62/P and the CWU-72/P combination under these test conditions.***

Continued

Suit Configuration	Condition of CWU-62/P	Undergarments
1	3/32" hole, mid-back 2 pin holes, navel level	CWU-23/P liner CWU-43/P, -44/P underwear
2	3/32" hole, mid-back 2 pin holes, navel level	CWU-72/P liner CWU-43/P, -44/P underwear
3	2" tear, back shoulder seam*	CWU-72/P liner CWU-43/P, -44/P underwear

*Note: CWU-27/P, CWU-72/P and CWU-43/P, -44/P also had 2" tears in the back shoulder seam.

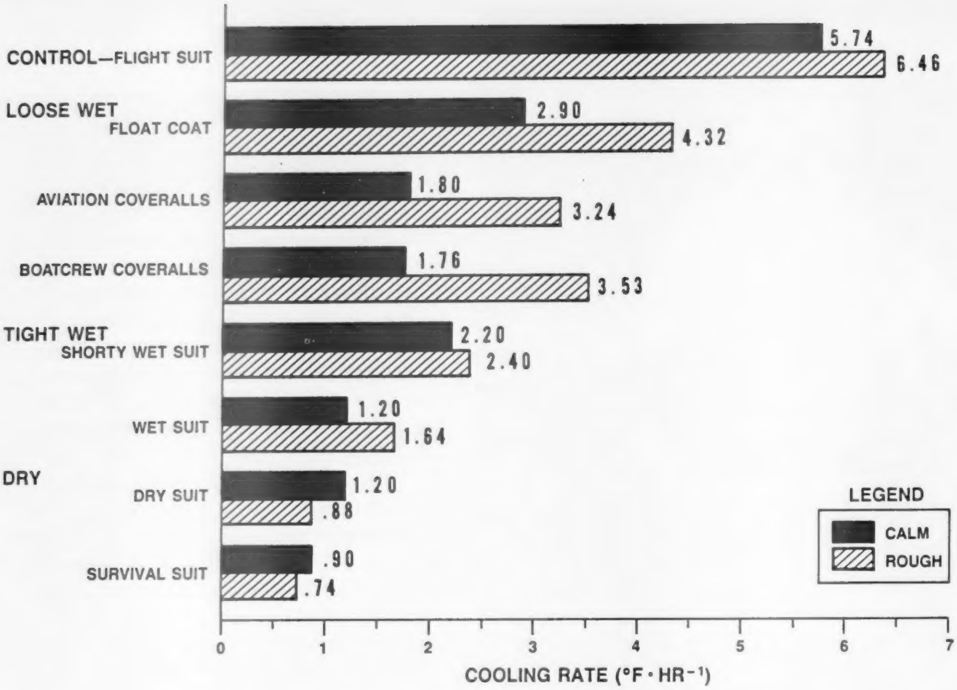


Figure 2. Mean Core Temperature Cooling Rates in Calm vs. Rough Seas

Since many mishaps occur over open seas, the question of whether results obtained in still water are indicative of actual performance in rough water was addressed during two separate open-water test programs conducted by the U.S. Coast Guard in 1985-1986.

In the first of these programs, eight garment ensembles were evaluated. A flight suit was used as the control configuration. Also included were two tight-fitting "wet" garments (a 3/16-inch thick custom-fit full wet suit, and a 1/8-inch thick shorty wet suit), three loose-fitting "wet" garments (the MAC-10 aviation coverall, a boat crew coverall and a thermal float coat) and two "dry" garments (3/16-inch neoprene foam insulated quick don type suits). Mean calm-water temperature was 51 degrees Fahrenheit. Rough-water mean temperature was 52 degrees Fahrenheit with 4- to 6-foot swells, occasional 4-foot breaks, 2- to 3-foot wind-waves and a 3-knot current.

The results showed significantly faster core temperature cooling rates and significantly larger declines in skin temperatures in rough seas than in calm seas for subjects wearing loose-fitting "wet" garments. In general, "dry" garments provided better protection than did "wet" garments in both sea conditions (figure 2), and tight-fitting "wet" garments provided better protection than did loose-fitting "wet" garments in rough seas. In addition, the observed core cooling rate for the shorty wet suit was approximately 1½ times that of the full wet suit. These results indicated the importance of fit and body coverage for wet suits which rely on tightness for minimizing water flushing and maximizing their insulation.

During the second water test program both damaged and undamaged CWU-62/P — CWU-72/P configurations as well as full body custom fitted 3/16-inch wet suits and the MAC-10 aviation coverall were tested. The air temperature for these tests ranged from 40 degrees Fahrenheit to 50 degrees Fahrenheit, and the water temperature ranged from 40 degrees Fahrenheit to 45 degrees Fahrenheit. Sea state for all of the runs included 4-foot breaking waves. Runs were scheduled for a maximum exposure time of two hours but were terminated if the rectal core temperature of the subjects dropped to 95 degrees Fahrenheit.

Although a full analysis of the results is not yet complete, linear cooling rates for core temperature have been calculated (figure 3). For tests in which the subjects remained in water for the entire two hours, the cooling rates were twice as fast for the wet suits as for the intact CWU-62/P system. Torn CWU-62/P systems resulted in cooling rates comparable to the MAC-10 aircrew coverall which is a looser fitting, neoprene foam insulated wet suit. For these environmental and sea state conditions, only the intact CWU-62/P dry suit system met the current OR since it was the only configuration that kept core temperatures above the minimum established 95 degree Fahrenheit end point after a two-hour exposure.

For the runs where subjects boarded a raft (the developmental LRU-18/P "miniboat") after 10 minutes of immersed time, cooling rates were much less drastic. The intact CWU-62/P system and the custom-fitted wet suit were equal. Under

these conditions, all of the configurations would be expected to maintain core temperature levels above 95 degrees Fahrenheit for two hours. This excludes the flight suit configuration with thermal underwear only which still could not maintain a sufficient core temperature even with the raft available.

Several conclusions can be drawn from this second rough sea testing program. First, only the intact CWU-62/P and CWU-72/P combination met the OR under these conditions. Second, regardless of suit design or leakage, no buoyancy or raft boarding problems were encountered. Third, perhaps the best protection of all, regardless of conditions, is to get the survivor into a raft. This action alone can do more to substantially decrease cooling rates and extend survival time than many of the variations in assembly design and components. Fourth, designs which allow increased amounts of water to flow into the suit, such as the MAC-10 or looser fitting wet suits, can seriously degrade the level of protection provided. Likewise, it is obvious that damage to any anti-exposure system, wet or dry, will degrade the level of protection afforded.

In summary, the choice of a constant wear anti-exposure system involves compromises. No available exposure suit is as comfortable as a summer flight suit, and no constant wear suit is as protective as the quick don neoprene foam dry suit. These items would represent the ultimate choices for comfort and protection, if the need could be limited to one or the other. However, this is not the case.

Rather, there is an inherent conflict in performance

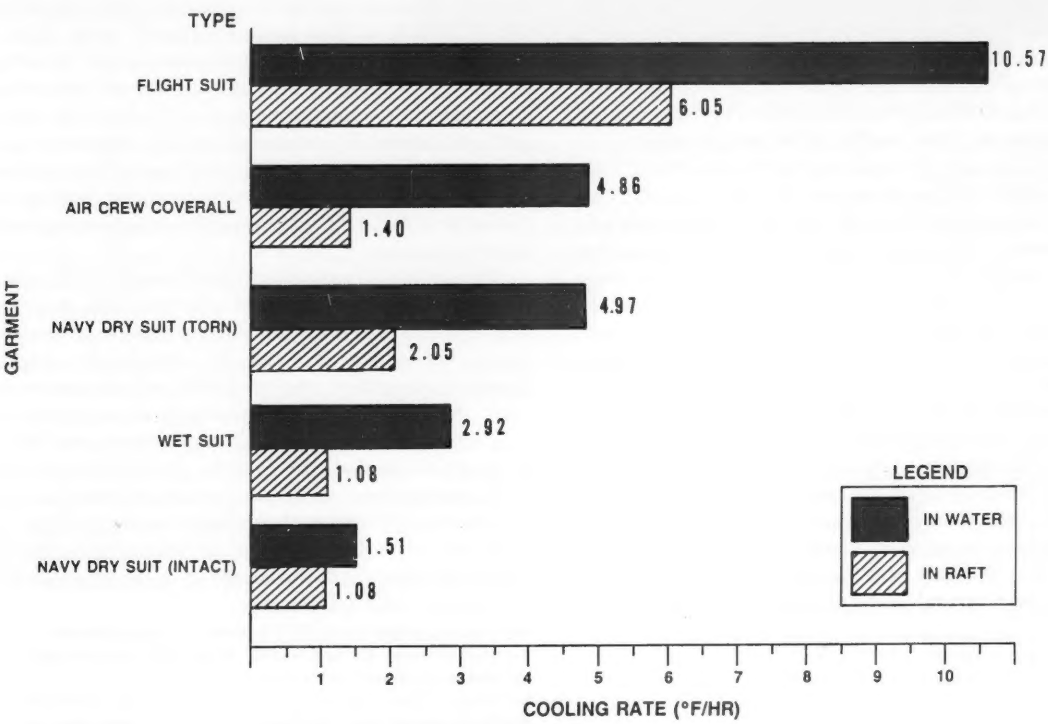
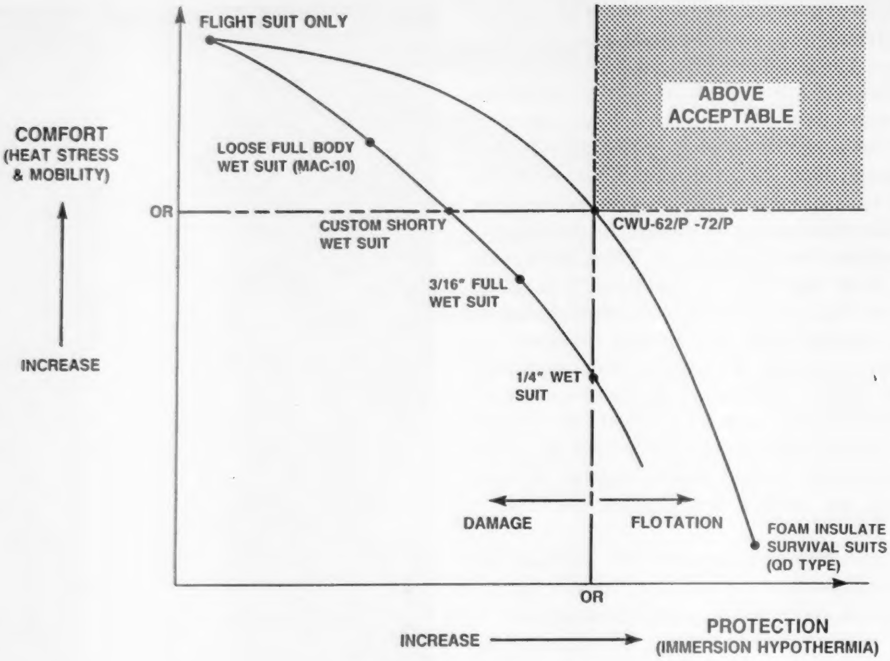


Figure 3. Mean Linear Cooling Rates



ROUGH WATER CONDITIONS
CONSTANT WEAR

Figure 4.

requirements for the anti-exposure system due to the need for it to function in two very opposite environments. The system must allow for cooling and unencumbered mobility in flight, yet provide for extended heat conservation in a cold water emergency. The CWU-62/P and the CWU-72/P system is the optimum solution to this conflict *at the present time*.

Figure 4 graphically illustrates the superiority of the CWU-62/P and CWU-72/P combination. The OR has established minimum requirements for both emergency protection and inflight comfort. The shaded area in the figure illustrates above-acceptable performance. As illustrated, there are some items which exceed the protection level of the CWU-62/P, and there are some which exceed the comfort level but there are none which offer any better compromise for now. More importantly, there appears to be a general trend for both wet suits and dry suits as illustrated by the curves in the figure. For the dry suits, as insulation layers are increased, comfort decreases while protection increases. Likewise, for the wet suits, as thickness of foam, tightness of fit and area of body coverage increase, there is a corresponding increase in protection and decrease in comfort. The difference lies in the basic fact that water conducts heat away from the body 27 times faster than air. As a result, *wet suits just aren't as protective as dry suits, given an equal level of comfort*, simply because they allow the body to have contact with cold water. Thus, the basic protection and comfort compromise curve for wet suits lies below that of the dry suits. Both curves will shift to the left if damage to the equipment occurs and to the right when the raft is introduced. To increase protection, without compromising comfort, is extremely difficult. Future efforts to improve the comfort of the wrist seals, neck seals and zipper orientation of the CWU-62/P will accomplish at least a small shift in upward direction.

Although it is recognized that the A-6 and EA-6B communities risk damaging their anti-exposure system during ejection, more so than other aircraft, the chances of needing to eject at all are still very low. In addition, the chances of damage to equipment, non-availability of a raft and extended SAR time all occurring simultaneously are extremely small. As a result, the choice of anti-exposure system must be driven by a greater emphasis on in-flight comfort and emergency performance of the system in an undamaged condition. In this regard, dry suits offer both increased comfort in-flight and a higher level of emergency protection the majority of the time, and are therefore still considered to be the optimum choice for constant wear applications.

Mr. Tran is a project manager for aviation life support systems, Naval Air Systems Command, Washington, D.C. He has a B.S. in mechanical engineering from the University of Maryland.

Ms. Reeps is with the Aircrew and Systems Technology Directorate, Naval Air Development Center, Warminster, Pa. She is a team leader in the Life Support Engineering Division. She has a degree in design from Cornell University.

Read and "Heed"

By Capt. Hal Gielow, USMC

A RECENT development in helicopter aircrew survival equipment, the Helicopter Emergency Egress Device (HEED), will soon be issued to the fleet. This device will provide a quantum increase in an aircrew's ability to successfully get out of a sinking helicopter. There's one important caveat: They must be properly trained in order to safely use it.

The HEED system is simply a miniature SCUBA, consisting of a small air bottle and a demand regulator. It is designed to be carried in the modified holster pocket of the SV-2 vest and will provide breathable air for a minimum of two minutes with the aircrewman submerged at depths of up to 20 feet. Used properly, it will give aircrewmen that extra margin of safety to enable them to survive a water ditching.

It is not, however, a panacea. Familiarity with the water environment, the aircraft and periodic training are still prerequisites to survival. Just as you must become familiar with your aircraft limitations, so too must you become familiar with the limitations of your survival gear.

Use of the HEED by untrained personnel could result in serious injury as a result of improper breathing techniques or aspiration of water. Holding your breath while ascending to the surface after breathing compressed air underwater, even at depths as shallow as four feet, can cause your lungs to rupture. The resultant escape of air bubbles into the blood stream can be fatal.

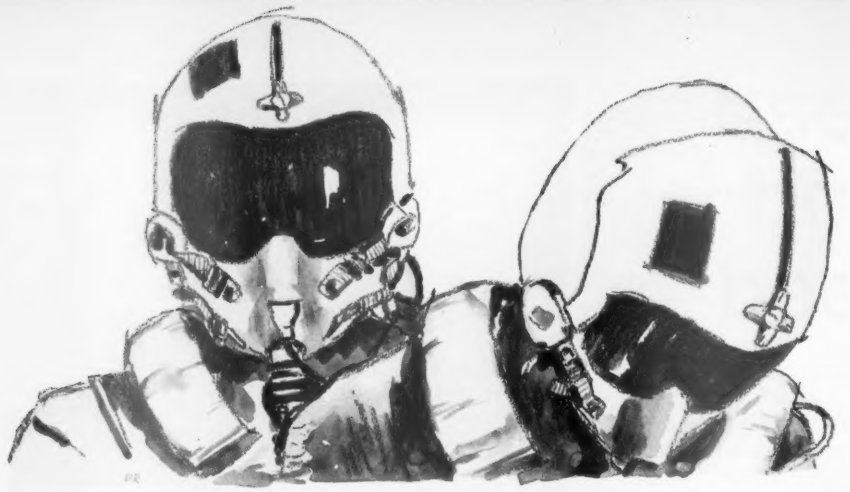
The HEED (Helicopter Emergency Egress Device) is shown being tested in the 9D5-A Multiplace Underwater Egress Trainer.

Clearing water from the regulator and mouthpiece of the HEED while underwater, if not done properly, can cause aspiration of water and accidental drowning. You need a thorough understanding of the principles of breathing compressed air underwater, as well as hands-on training that will develop instinctive breathing techniques. Both are necessary to prevent these serious injuries.

Naval aviation water survival instructors will be trained in the use of the HEED system beginning in the fall of 1986. These instructors will, in turn, begin training fleet aircrewmen at the various naval aviation water survival training sites. Those units or individuals who have already procured (or are planning to procure) the HEED system through open purchase should be aware of the inherent danger to untrained personnel using this device.

As a helicopter pilot who has witnessed several water ditchings, I am anxious to see this system on the street. However, as a certified SCUBA diver, I am also concerned about the possibility of injuries due to improper use of the system. Our goal is to give you the best chances of survival in a water ditching emergency. Your training in the proper use of the HEED system will make this happen.

Capt. Gielow is a Marine instructor pilot assigned to the Naval Aviation Schools Command Water Survival Model Manager Department at NAS Pensacola, Fla. He served tours as an AH-1 pilot with HMA 269, HML 167 and as part of the Cobra contingent assigned to composite squadron HMM 261 during the 1983 Grenada operation.



. . . Not hearing a response to his altitude query, the RIO asked, "Do you have control?" Joe didn't answer. The RIO repeated louder, "Do you have control?" Joe, after an uncomfortable delay, mumbled something that sounded like, "I don't know" . . .

Exploding The Myths About G-Induced Loss of Consciousness or Cause of Mishap: Loss of Situational Awareness

MEET Joe*. He graduated near the top of his class as a student naval aviator and was selected for the SERGRAD program for his first aviation tour. Following that tour, he was able to get an F-14 seat — a position he had been working toward for some time. He was a fairly typical F-14 pilot, a senior lieutenant, looking forward to lieutenant commander next year. He loved flying and really enjoyed the challenges of the ACM environment. He had been working as assistant operations officer in his squadron for the past nine months and felt good about himself, his job and his home life. He was married with two daughters, ages 2 and 6.

About five years ago, he became extremely interested in physical fitness. He began jogging three to four times each week, gradually building his distance until he was jogging 30 to 40 miles in the weeks when he wasn't at sea. He was proud of this accomplishment and routinely entered local marathons. He also congratulated himself during his annual flight physicals when his blood pressure was measured as only 110/60 and he had a resting pulse of 60.

Joe had a promising career — until that fateful day last August. He had felt a little under the weather the night before and had not slept well but decided he wasn't sick enough to ground himself. Joe was, however, in fairly good spirits on the day of the flight.

The brief went well. Preflight, taxi and takeoff were all normal. It was a 2 vs. 2 ACM hop with the sister squadron. The scenario called for two F-14s as aggressors; Joe was flying the lead aggressor aircraft. The first intercept was a fly-through. The first engagement (second intercept) began with the aggressors flying east to engage the adversary flying west. Joe came in low, climbing to 11,000 feet AGL for the intercept. As the flights merged, Joe entered a left 4G level turn to

*Joe and this scenario are a fictional composite of several mishaps.

By Cdr. Terrence J. O'Leary, MSC

the north. Several shots were called by various participants.

After 360 degrees of turn, the RIO suggested breaking away. Joe responded, "No, I have a bogie on my nose." The RIO replied, "Roger," as he rechecked airspeed, altitude and fuel. The RIO noted an increase in G forces followed by a decrease. The nose had dropped below the horizon. The aircraft descended through about 8,000 feet AGL and the angle of bank had increased to about 35 degrees left wing down. The RIO, feeling uncomfortable, advised the pilot to watch his altitude. The RIO rechecked the airspeed, 280 KIAS, to insure they had not departed controlled flight. Not hearing a response to his altitude query, the RIO asked, "Do you have control?" Joe didn't answer. The RIO repeated louder, "Do you have control?" Joe, after an uncomfortable delay, mumbled something that sounded like, "I don't know."

The aircraft continued descending in a spiral. The nose fell to 30 degrees nose low, as the aircraft approached 90 degree angle of bank, and airspeed increased toward 300 KIAS. At about 2,000 AGL, the RIO initiated command ejection. The RIO came down through pine trees. Fortunately, he was able to release his koch fittings and drop only a few feet to the ground. The pilot was not so fortunate. Joe hit the sloping terrain before his parachute fully opened.

Naturally, a mishap board was convened and an investigation into the causes began. The wreckage was carefully examined. Engineering investigations were conducted on various aircraft components, and interviews with eyewitnesses and maintenance personnel were completed. No mechanical malfunction could be found. What was missed? What happened?

One member of the board suggested the possibility of G-induced loss of consciousness (G-LOC). In other words, the pilot had pulled enough Gs, without adequately protecting himself, so that sufficient blood did not reach his brain. He therefore eventually lost consciousness. However, the mishap board did not accept this suggestion for several reasons.

Myth #1. The RIO said that Joe was talking to him the whole time. There was a "brief" period of silence just before the pilot mumbled, "I don't know." Obviously there was no long duration incapacitation or unconsciousness involved. **Truth**: Typically, with G-LOC, the unconscious episode will last approximately 15 seconds. This assumes that the G-forces are sufficiently reduced to allow renewed circulation of the blood. Unconsciousness is not necessarily prolonged.

Myth #2. Joe seemed to be making control inputs during that period of silence. Obviously he was conscious. **Truth**: Based on centrifuge studies, when pilots lose consciousness from high G forces, their hands may remain on the control stick. Even though unconscious, they may still be making random "control inputs" to the aircraft.

Myth #3. Joe seemed to be responding after that period of silence. He appeared to be trying to recover the aircraft. **Truth**: After recovering from G-LOC the individual is confused and disoriented. Although responding verbally, Joe may not have been aware of everything going on around him. He also might have been unaware of even having been unconscious. Adding to his confusion, he might have been trying to figure out how he lost altitude, how he got into the steep angle of bank, etc.

Myth #4. He wasn't pulling enough Gs. Joe had routinely pulled six and seven Gs during ACM. Four Gs wouldn't have bothered him. **Truth**: Susceptibility and resistance to G forces vary. Joe had several things working against him. He wasn't feeling well. Mild illnesses can cause a loss of fluids and a slight drop in blood pressure. Susceptibility was probably increased. Next, even though Joe's aerobic fitness was superb, his lower than normal blood pressure could have decreased his tolerance to G forces. Third, this flight occurred in mid-summer. Joe's fluid intake may not have been adequate, and dehydration would have decreased his tolerance to G forces. A properly-fitted anti-G suit would have helped Joe. He was wearing his anti-G suit, and it was connected. At the time that he was getting into the aircraft, the plane captain helped him connect it. Did it remain connected? Unknown. Was it properly fitted? Unknown. Proper fit had not been checked recently, and Joe may have lost some weight with all that exercise. Finally, Joe was in that steep turn for some time. His anti-G straining maneuver may have been weak, becoming ineffective when he diverted his attention to the bogie. Perhaps a simultaneous slight increase in G-forces was just enough to make the difference.

Can G-induced loss of consciousness be proven? That is a tough question. G-LOC is characterized by three things:

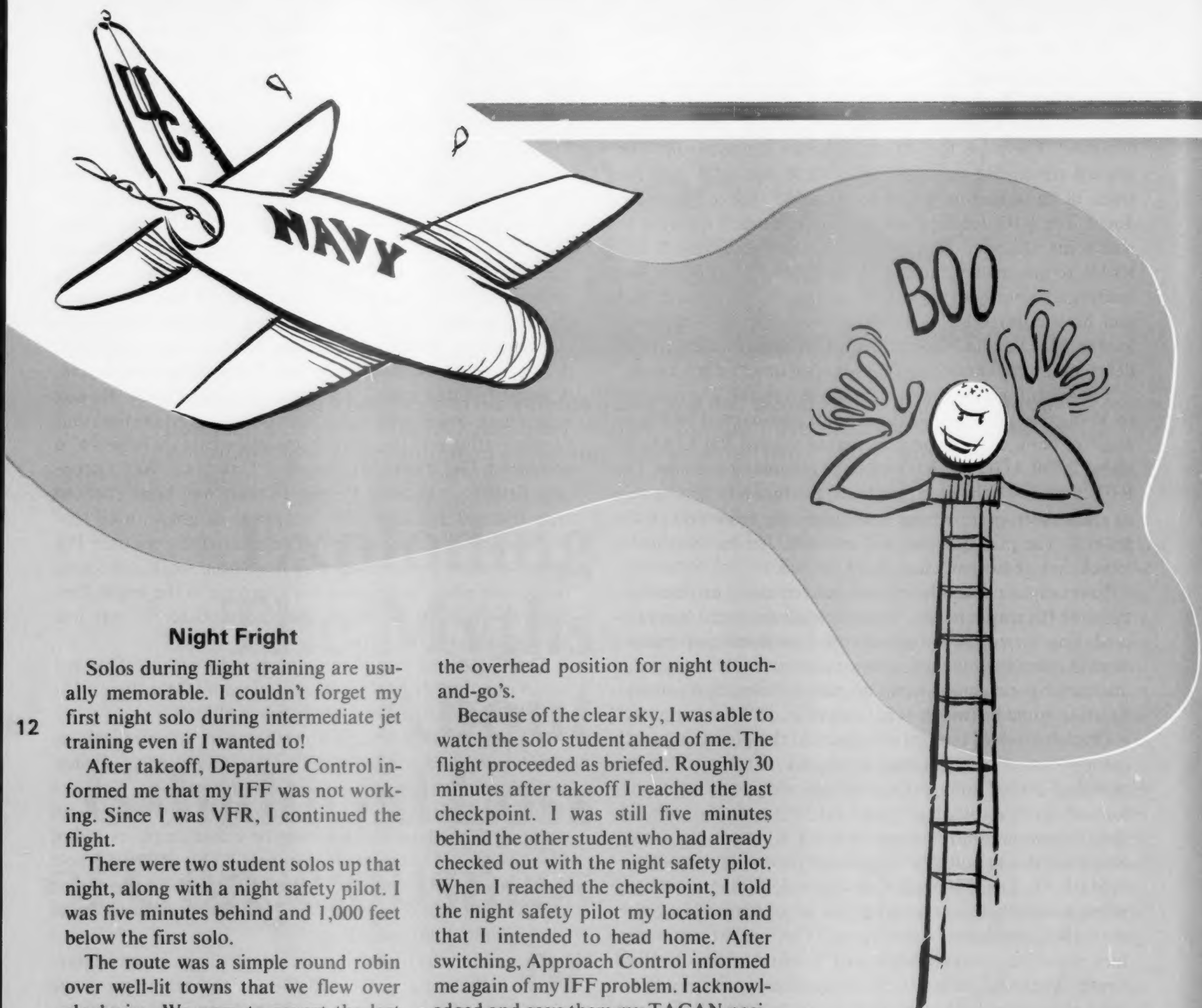
- Pulling positive Gs, even as few as three.
- A period of silence and no response to communications.
- A period of confusion following the period of silence, with slow or inappropriate reactions or responses.

In a fatal mishap, however, nothing can be proven by an autopsy. Final determination may be stated simply as, "Pilot error — loss of situational awareness." This covers a whole host of possibilities and does not identify probable reasons for the "loss of situational awareness." It makes preventing future mishaps more difficult.

Prevention of G-LOC involves three things: proper equipment, including a well-fitted G-suit; and training in, and regular use of properly performed anti-G straining maneuvers, with a basic understanding of the underlying physiology; and maintaining proper health, including adequate hydration and a physical fitness program of weight lifting with moderate amounts of aerobic exercises. This type of fitness program is somewhat controversial. However, some experimental studies have indicated that it is valid. A suggested limitation for joggers has varied from a conservative maximum of nine miles per week up to a more generous 15-20 miles per week. Weight lifting or resistance exercises should include conditioning of both upper and lower body muscle groups.

For more information, invite your local friendly aviation physiologist, aeromedical safety officer or flight surgeon to lecture on G-LOC at your next AOM or safety stand-down.

Cdr. O'Leary heads the Physiology Branch in the Aeromedical Division at the Naval Safety Center, Norfolk, Va. He has a masters degree in biology from Central Missouri State University.



Night Fright

Solos during flight training are usually memorable. I couldn't forget my first night solo during intermediate jet training even if I wanted to!

After takeoff, Departure Control informed me that my IFF was not working. Since I was VFR, I continued the flight.

There were two student solos up that night, along with a night safety pilot. I was five minutes behind and 1,000 feet below the first solo.

The route was a simple round robin over well-lit towns that we flew over clockwise. We were to report the last checkpoint to the night safety pilot, make a starboard turn, switch to Approach Control and fly straight to the overhead position for night touch-and-go's.

Because of the clear sky, I was able to watch the solo student ahead of me. The flight proceeded as briefed. Roughly 30 minutes after takeoff I reached the last checkpoint. I was still five minutes behind the other student who had already checked out with the night safety pilot. When I reached the checkpoint, I told the night safety pilot my location and that I intended to head home. After switching, Approach Control informed me again of my IFF problem. I acknowledged and gave them my TACAN position. They rogered my position and gave me a traffic call at 11 o'clock and five miles, which I took to be the other

Let Anymouse Know. We encourage you to write Anymouse whenever you see "a mishap about to happen." If you know of a hair-raising situation in the air or on the deck, let Anymouse know about it. You may help someone else avoid an unsafe incident.

Anymouse is a unique department in Approach where no names are used. All information is anonymous. In fact, Anymouse was born three decades ago when someone couldn't spell "anonymous" and signed his letter "anymouse." Thus, a mouse wearing flight gear has become a worldwide naval aviation safety symbol.

Over the years we have found it is often more prudent and speedy to report unsafe situations anonymously. Keep in mind, though, that Anymouse is not interested in personality conflicts or non-constructive criticism of individuals. All views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

For your convenience, postpaid Anymouse mailing forms are available in most ready rooms and from most flight safety officers. Use of the form is not mandatory, though. Just jot down your thoughts and mail to Anymouse, Approach Magazine, Naval Safety Center, NAS Norfolk, VA 23511-5796.

solo. They said to follow that aircraft to the overhead position.

After rolling wings level I could see the familiar red light I had been following around the sky that night. As expected, it was roughly halfway between my position and home field. I immediately started a descent to the initial altitude while watching my friend in front of and below me.

After a few minutes it appeared I was catching up with the other aircraft. I started slowing down and continued to watch my friend. As I continued to close, I began to wonder if he was having trouble. The distance between us was closing rapidly, so I dropped my flaps and popped my speed brakes. By this time I was so engrossed in watching my buddy that my instrument scan was non-existent.

Finally, I was close enough. I added power, put the boards in and raised the flaps as I went around my friend. My "friend" turned out to be a *radio tower* approximately halfway between the last checkpoint and home field. I had come within several hundred feet of blacking out the radio station temporarily and myself permanently.

Lessons learned? You bet. First, keep scanning. This near mishap would not have happened had I not broken the initial altitude. If in doubt, communicate. A simple update about traffic from Approach Control or my friend (TACAN position) would have helped tremendously. Finally, think twice about continuing a flight with an inoperable transponder, even if it is VFR.

Closecallmouse

Protective Clothing For Refuelers

Refuelers are not wearing their protective equipment! If a refueling aircraft catches fire, they are going to get hurt. I have seen them wearing utilities with the sleeves rolled up, cranials without eye protection, etc.

If refuelers were forced to wear protective clothing similar to that worn by aircrews, with goggles and gloves, the injuries that would be incurred in an aircraft refueling fire would be minimized.

Watchingoutforyoumouse

You're 100 percent correct in your observations, but unfortunately, it's not that simple. Policy and procedures concerning aircraft refueling at all Navy and Marine Corps shore activities are contained in the Aircraft Refueling For Shore Activities Technical Manual (NAVAIR 06-5-502). The intent of the manual is to provide sound guidance while operating a variety of equipment at wide-spread geographical locations, according to LCdr. John H. Starnes, Naval Safety Center air operations analyst. Because of the varied climate conditions from Guam to Alaska, the mandatory use of protective clothing was purposely omitted. Garments made of cotton or other natural fibers are recommended.

Only shipboard refueling crews are required to wear long sleeve cotton jerseys, cranial helmets and goggles, but there is no prohibition against individual shore stations setting similar standards. Moreover, the Navy is presently searching for improved articles of clothing. While several types are available, all have some undesirable features. For example: They are heavy, uncomfortable, do not breathe, have poor wear and soiling characteristics, and in at least one instance the garment melted, sticking to the wearer when exposed to fire.

Until an adequate solution is found, the following recommendations will lead to safer refueling operations at your activity:

- *Attention to detail in the operation, care, maintenance and repair of refueling equipment. If properly maintained, refueling equipment will not leak.*
- *NAVAIR 06-5-502 isn't needed to set local policy. Supervisors may certainly require refueling crewmen to wear long sleeve shirts/utilities, cranial helmets and goggles.*
- *Ensure refueling crews and all others working on the flight line/ramp fully understand the operating procedures and limitations of the portable fire extinguishers. Far too often, the person attempting to operate an extinguisher* ***did not know how to use it or it failed to operate.***

Bomb Disposal Safety

"They can't do that!"

"I can't believe they did that!"

"That's not very smart!"

These were a few of the comments in my ready room recently when we heard that another squadron had jettisoned live bombs in a body of water near our base.

A number of aircraft had taken off from Homeplate with live 500-pound bombs. The target weather was determined to be unworkable, so instead of returning with unexpended ordnance, the flight lead chose to jettison the bombs. He figured it would be more impressive to RTB with a break and, besides, ordnance would appreciate it. The other aircraft followed the flight lead and dropped their bombs in the water.

In the debrief they tried to explain that the bombs were jettisoned "safe" in an unpopulated area of ocean. I think that when unexpended or hung ordnance is briefed and flown that we must play by the rules until the flight is over.

It is not "safe" to create our own ordnance jettison areas and the "big ocean, little bullet" theory simply does not apply. The delay that would be experienced by the squadron in the dearming area is a far better option than discovering your "safe" bombs caused an international or local incident.

Bombedoutmouse

Keep That S

. . . A split second later, I heard the radar altimeter beep, followed by a sharp pitch up of the aircraft. The altimeter confirmed what I feared — we had dropped to within 300 feet of the water . . .

Scan Going!

By Lt. Mike Killian

(Author's Note: The events described in the following article, though fictitious, have their basis in reality)

DURING the past three weeks, the carrier had been operating on GONZO station. On today's flight, the hop looked like just another 2+15 night AIC in the North Arabian Sea. The mission itself was two-fold: The first hour was to consist of max-conserve intercepts (AIC) between two sections of F-14s, with control provided by an E-2 Hawkeye. The E-2 was then to provide marshal information and control for all four fighters, who were to execute practice approaches before their scheduled recovery time. Using data link and voice backup, the E-2 was to assist the F-14s in station-keeping, while also providing vectors during the approach phase. When on final, each aircraft was to wave off at 600 feet and one mile from the CV, before returning to marshal to await the actual recovery. Piece of cake (or so it seemed during the brief).

The first part of the hop went without incident, with each section running at least four intercepts. The night itself was "serious" case 3, with an overcast layer at 2,000 feet and no moon. On the way over to our pre-briefed marshal fixes, our section got a few practice plugs from the A-6 at 8,000 feet. Then we moved on to our E-2 controlled approach, which was to be a graded exercise for one of the Hawkeye back-seaters.

We arrived at marshal with at least 30 minutes to spare before the actual scheduled recovery was to begin. Due to coordination problems with strike, our practice approaches were delayed 15 minutes. Data link information was accurate throughout. When we finally received the green light to push, we noted that we were a little below our fuel ladder — holding at a lower altitude had cost us some gas. We pressed on, holding the gear at the 10-mile fix in order to save a little fuel. As we approached six miles, the pilot switched to tanker control on the front seat radio, in order to find out if there was any fuel available. I took another quick glance at my backseat fuel totalizer. A split second later, I heard the radar altimeter beep, followed by a sharp pitch up of the aircraft. The altimeter confirmed what I feared — we had dropped to within 300 feet of the water. Neither pilot nor RIO had noticed the altitude loss until the radar altimeter had gone off at 400 feet, where the pilot had set it. The aircrew and aircraft had been saved only by an electronic device and by the pilot's quick reflexes.

After breaking off the approach and heading back out to marshal (this time for the real thing) my pilot and I had time to discuss our incident. This is what we came up with:

- Stick to assigned roles, especially when doing something out of the ordinary (like an E-2 controlled approach). It was not normally the pilot's job to switch frequencies and handle the radio communications. This may have contributed to a breakdown in the pilot's scan when it was needed most — during an approach low over the water on a black night.
- Keep your scan going! (How many times have you heard that one?) Your altimeter and airspeed indicator are lifesavers — keep an eye on them. I also had a breakdown in scan at a time when it was needed the most. Our lapse in scan was probably the result of a combination of fatigue, complacency and distraction.
- Back the other crew member up to the max; do your share of the work and then some. Fight the tendency to go along just for the ride. Remember, if the pilot plants it in the water, the RIO is only a nano-second behind.
- Never assume anything! Both crew members assumed that the other was monitoring the altitude. Wrong!
- Prioritize. The aircrew allowed their concern for fuel to overshadow a more pressing, immediate concern — staying out of the water. You can't refuel from 50 fathoms.
- Use your radar altimeter — it can save your life. Its scan never breaks down. If you don't now include it in your predescent checklist, then you should start.

Enough said. You can bet we had our scans going full-bore on our next approach. All the way down to an OK three wire. And that scan's been going strong ever since. ◄

Lt. Killian is a RIO who has deployed in the F-4 and F-14. He completed his first sea tour with the Freelancers of VF 21 and recently returned from a Western Pacific/Indian Ocean deployment aboard USS *Constellation* (CV 64).

1985 Navy Ejection Summary

By Sharone T. Thornton

THE results are in! 1985 was the best year EVER for the Navy's ejection seat community — a 95 percent ejection survival rate. This is an 11 percent increase over 1984 and the highest survival rate since 1963, when it was 90 percent. A total of 41 aircrew ejected from aircraft in 1985; 39 survived.

The two ejection fatalities were out of the envelope for successful operation of the seat. In both cases, had the two pilots decided to eject scant seconds earlier, there is a strong probability they would have survived.

Knowledge of the safe ejection envelope of the particular seat may well have saved these pilots' lives. When you have to eject, seconds can mean the difference between life and death. Delay is one cause of ejection fatalities that can be eliminated through a conscious decision on the part of the aircrew to eject while the seat is within the safe ejection envelope. To do its job, the ejection seat must have time to operate.

The following narratives describe the two fatal ejections:

- At 14,000 feet, an EA-4F experienced engine chugs and stalls accompanied by severe airframe vibrations. Declaring an emergency, the pilot proceeded to a nearby NAS. Descending to 3,000 feet AGL, the pilot lowered his gear and flaps, beginning his descent for the approach. Five miles from the runway, the fire warning light came on with no secondary indications. At 600-700 feet AGL, the pilot began a slow left descending turn. Radio communications were lost as the aircraft passed over the field. At 200 feet AGL and over a nearby bay, the aircraft went nose down and rolled sharply right. The pilot then initiated command-sequenced ejection. The NFO successfully ejected and was rescued unharmed, but the pilot's delay placed him outside the seat envelope. He hit the water before seat separation and parachute deployment, suffering fatal injuries.
- Following an uneventful training mission, a T-2C departed controlled flight on final approach to landing. The student

naval aviator failed to recognize a stall and impending departure, then did not use proper stall recovery procedures. He was out of the envelope when he subsequently initiated ejection. Seat separation occurred almost simultaneously with ground impact, and the student sustained multiple impact injuries that were fatal.

Total numbers of ejections decreased dramatically also — from 74 in 1984 to 41 in 1985. This is the lowest number of ejections since 1953, during the earliest years of ejection-seat-equipped aircraft. In 1953, 33 ejections occurred, just four years after the first operational ejection in August 1949. The ejection rate for 1985 also decreased to 2.66 ejections per 100,000 man flying hours — the lowest ejection rate ever experienced by the Navy. This accompanying decrease in the ejection rate occurred even though the actual number of aircraft flying hours increased by several thousand.

The operating environment aboard aircraft carriers is the most inherently hazardous in aviation. Each year, mishaps occurring at or near flight deck level require instant decisions to either eject or ride the aircraft into the water. In 1985, two pilots found themselves in this critical situation. Luckily, neither of these pilots delayed their decisions to eject.

- An F/A-18 pilot, on final approach to the carrier at night, selected afterburner following a power call. Approximately one second later, the aircraft collided with the ramp in a nose-high attitude. The main mounts collapsed and the aircraft burst into flames as it skidded down the centerline on its wing tanks. The pilot ejected at the end of the angle deck in a wings-level attitude. He had a normal ejection sequence with full parachute deployment and was rescued with minimal injuries.
- An AV-8C pilot was executing his first shipboard short takeoff. Immediately upon leaving the deck edge, he reported his aircraft settling with a loss of thrust. The nose pitched up, and the pilot ejected just prior to impact. The ejection sequence was normal, and the parachute opened sufficiently to allow for deceleration prior to water entry. The FLU-8 automatically inflated his life vest, and he was rescued with minimal injuries.

The overwater survival rate also showed a major improvement during 1985 — from 87 percent in 1984 to 94 percent in 1985. This is also the highest rate ever experienced. The FLU-8 automatic life vest inflator and the SEAWARS automatic parachute release device played important roles in this increased survival. Of the 17 total overwater ejections, 10 aviators were equipped with both the FLU-8 and SEAWARS. Four others were equipped with the FLU-8 only. The single water fatality was the previously mentioned EA-4F mishap in which the pilot delayed ejection until he was out of the envelope. However, the FLU-8 automatically inflated, keeping him on the surface and allowing recovery of the body. SEAWARS automatically activated four times, and in two other cases, both FLU-8 and SEAWARS actuated automatically, saving one pilot's life.

In this case, the pilot ejected from the aircraft after experiencing out-of-control flight. He suffered a cervical fracture and concussion during severe opening shock, rendering him unconscious. After seat separation, the seat tumbled, hitting the pilot and fracturing his lower leg. This collision caused the RSSK to open prematurely, releasing the life raft and causing the lap belt assembly and carrier straps to tear away, completely releasing the RSSK and life raft. The remainder of the descent and water entry were apparently normal, since the pilot was located one hour later, still unconscious. The life vest had automatically inflated, keeping his head out of water, and SEAWARS had released the parachute. The helo rotorwash roused him, and he was semiconscious as the rescue swimmer attached the harness to hoist him into the helo. FLU-8 and SEAWARS undoubtedly saved this pilot's life since he couldn't have accomplished these actions himself.

Figure 1 shows the injury classifications resulting from ejection by type aircraft. The majority (68 percent) of these aircrew received minor injuries or were uninjured. This, of course, underlines the reliability of our ejection seats — *when* they are used within their design parameters. Our ultimate goal is 100 percent ejection survival. Your job is to know your aircraft, know your seat and know yourself. And if you must eject, do it without delay. ◄

Mrs. Thornton directs the Escape System Analysis Branch of the Aeromedical Division, Naval Safety Center, Norfolk, Va.

1985 Ejection Injury Classifications

Figure 1

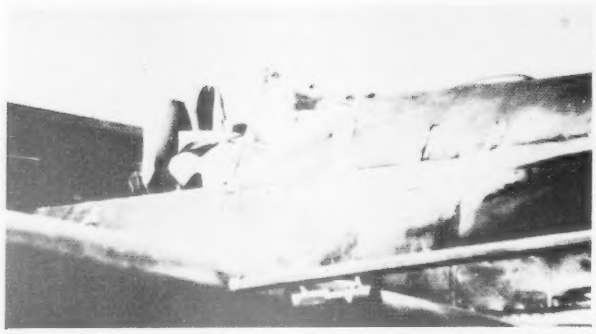
Type Aircraft	Total	Fatal	Major	Minor	Minimal/ None
A-4	7		2		5
TA-4	9	1	2	1	5
A-6	2			1	1
A-7(Escapac)	3		1		2
A-7(Stencel)	5		2	2	1
F-4	2		1		1
F-8	1				1
F-14	2		1		1
F/A-18	1				1
S-3	2		2		
T-2	2	1			1
AV-8	3				3
OV-10	2				2

Ejection seats have saved thousands of lives since their first use in World War II. Today, only a fool would fly with the ejection seat disabled. But back when the seats were first introduced, things were different.

Ejection Seats, The Early Years

By LCdr. Dave Parsons

Ground test of ejection seat with wooden dummy caught as it shoots skyward out of a FW 190A-0/U4.



Wooden dummy seated in ejection seat equipped German FW 190 fighter.

Photos from Focke-Wulf 190, Aero Series No. 18 Courtesy TAB Books, Inc.

Toward the end of World War II, allied pilots began reporting that they were seeing German pilots who popped from their stricken aircraft like corks from a bottle. Analysis of gun camera film revealed that this observation was true. The only explanation was that the Germans were using some sort of ejection mechanism.

As aircraft became capable of flying 400 mph, two things happened. The pilot's ability to manually bail out of a disabled aircraft diminished severely. And his chances of striking the rear control surfaces increased. Aircraft designers began to look at different ways to help the pilot get out of the aircraft without harm.

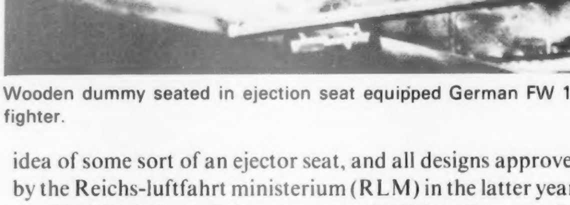
As they had in many fields of technology, the Germans took the early lead. They experimented with four different types of ejection seats: hydraulic powered, compressed air powered, explosive charge and even a giant torsion spring. The date of the first test ejection, performed by a parachutist named Busse, is uncertain: The first emergency ejection was by a Heinkel test pilot named Schenk on January 13, 1943.

An He 280 V1, piloted by Schenk, was being towed to altitude by two Bf110C aircraft prior to test flight under its own power when it encountered icing due to a heavy snow shower. When Schenk lost all control at 7,875 feet, he jettisoned the towline and ejected. This is the first recorded emergency use of an ejection seat. The Germans were sold on the idea of some sort of an ejector seat, and all designs approved by the Reichs-luftfahrt ministerium (RLM) in the latter years specified inclusion of ejection seats. Additionally, seats for earlier German fighters such as the FW 190 were tested for eventual retrofit. The Me 262 jet fighter, which was perhaps the most famous jet to see actual combat was scheduled to incorporate an ejection seat in the later versions. As the war ended the Me 262 seat was being tested in the Me 309 experimental fighter.

The most advanced seat was found in the He 162 jet, which used an explosive cartridge. The design included an emergency oxygen supply, automatic severing from aircraft systems, a jettisonable canopy and a seat type parachute.

Several seats from the He 162 were taken to the United States after the war and formed the basis for U.S. development.

Heinkel placed compressed-air-powered seats in its tandem



He 219 UHU, world's first operational ejection seat aircraft.

Vought F7U Cutlass which was equipped with Owen Polley's unproven seat.

place, He 219 twin engine night fighter. The He 219 UHU (or Owl) was the first ejection-seat-equipped aircraft in the world to enter operational use. No precise records exist on actual operational ejections, but by the end of the war some accounts credit as many as 60 saves to ejection seats.

Allied interest in ejection seats was evidenced by the intense postwar race to develop seats similar to the German examples. The Martin-Baker Co. of Great Britain which had previously shown interest in escape devices, took over where the Germans left off. After a series of practice ejections, Bernard Lynch made the first live ejection on July 24, 1946, at 320 mph at 8,000 feet. The U.S. Navy had joined hands with Martin-Baker as early as 1945, buying a 110-foot test rig and seat. The first test shot was made on August 15, 1946. Meanwhile, the U.S. Air Force was anxious to beat the Navy in making the first live airborne test. Using a modification of the He 162 seat, First Sergeant Larry Lambert ejected from a P-61B on August 17, 1946, at 300 mph at 7,800 feet. His comment after landing was "Man, whatta whoomp!" The Navy subsequently made their first airborne test using the Martin-Baker seat on November 1, 1946. Ltjg. A.J. Furtek ejected from a JD-1 at 350 mph at 5,000 feet.

In a few short years, the ejection seat became a standard feature of the emerging generation of jet aircraft. Despite the intense competition between the services in ejection seat development and testing, the seats did not win universal acceptance by the operational users. Many pilots preferred the traditional forced landing, ditching or bailout to the ejection option. A common fear was the "bang seat" which was an invitation to back injury. Some squadrons kept the seats pinned rather than risk being the first guinea pig to test the seats operationally. One of the Navy's earliest ejection-seat-equipped aircraft was the Vought F6U Pirate, which was in development at the same time Ltjg. Furtek was preparing to make his ejection. The Navy directed Vought to manufacture their own seat for the Pirate. The task fell to Mr. Owen Polleys, a cockpit design engineer, who was given a government-made catapult gun to fire the seat and a German ejection seat to use as a reference. The Pirate flew in October of 1946, just prior to Furtek's initial ejection. The Pirate seat was never tested with a live subject, and when a pilot tried to use it during an emergency some months later, he found it deactivated and was forced to make a gear-up landing. The honor of the first Navy emergency ejection then passed to Lt. Jack Fruin in a F2H Banshee on August 9, 1949 (see box). Despite Fruin's successful ejection, acceptance was still slow. On July 7, 1950, Vought test pilot Paul Thayer ejected from a flaming XF7U-1 Cutlass only after failing in an attempt to bail out. Thayer was demonstrating the Cutlass at Pax River when he suffered a failure in the troubled afterburner section. The tail erupted into a fireball during a pull into a vertical roll after a 600-knot pass. Thayer did not want to be the first test subject for Polley's untried seat. He attempted to roll the Cutlass inverted and drop out. The Cutlass was notorious for its slow acting, rheostat-controlled trim, and Thayer was unable to trim it properly to drop out. He had released his harness in this attempt and now was faced with a dilemma. The last option remaining was the unproven ejection seat, but he was no longer strapped in. With no other alternative, he righted the Cutlass and initiated the ejection. It was successful, proving Polley's design to be good.

It really wasn't until the Korean War in 1950-1953 that ejection seats won widespread acceptance. Tales of ejection seats saving pilots from both Navy and Air Force jets begrudgingly earned the seats a good reputation. Lt. K.J. Blight of the Royal Australian Air Force was convinced after he was forced to resort to ejection during the conflict. Returning from a fighter sweep over North Korea in a Meteor jet fighter, Blight was jumped by a MIG-15. 37mm cannon fire shaved 4 feet from his starboard wing and damaged his starboard engine as well. His initial thought was to crash land the Meteor at his home field 20 miles away. However, during controllability checks at slow speeds, he discovered his aircraft was uncontrollable below 190 knots, which he deemed too fast for a crash landing. Proceeding to some mud flats a few miles from the base, Blight ejected, making him the first pilot from the British Commonwealth Air Forces fighting in Korea to be able to tell the tale. A squadronmate made the first Meteor ejection two weeks earlier only to be captured.

It was clear at the close of hostilities in Korea that the ejection seat was a proven aid to pilots in distress. Yet, ejection seat development was still in its infancy. Low-altitude ejections were out of the envelope. Truly integrated seats, command ejection, zero-zero capability and automatic functions were still in the future.

Later improvements will be covered in the next article on the history of ejection seats. Special thanks to the time and knowledge contributed by the following people, without which this article would not be possible: Owen Polleys, Kaman Aerospace; Walter Boyne and Jay Spenser, National Air and Space Museum; Mike Hood, Aviation Research; and authors William Green and Eloise Engle. — Ed.

The First Ejection

By Peter Mersky

It happened on August 9, 1949. Lt. Jack L. Fruin of VF 171 was on a routine training flight after picking up a new F2H Banshee at Cherry Point. Flying at 38,000 feet, Lt. Fruin, "Pappy" to his squadron mates, noticed a spot of frost forming inside his canopy. Soon, the entire inside of the canopy was covered with ice, some of it nearly an inch think. The cockpit was nearly pitch black.

Pappy brought the Banshee down, thinking the warmer air would defrost the canopy, but suddenly, the rate-of-climb indicator began oscillating and quickly stopped altogether. Then, the whole instrument panel went crazy. Pappy guessed that ice had clogged the outside ports for the pitot-static instruments.

He knew he could keep his wings level, but he couldn't tell whether he was in a dive or climb. The Banshee began buffeting wildly, slamming him around the cockpit. The aircraft was approaching supersonic speed, outside the design limits for the straight-winged F2H.

The young pilot knew he was facing a critical decision: stay with the plane or use the new-fangled ejection seat. Many of the first-generation jet aviators were reluctant to use the seat. The idea of being shot out of their warm, comfortable cockpit was not appealing. In addition, Fruin's plane was fresh from the factory. He wasn't sure if the complicated ejection seat mechanism was even installed correctly.

As the plane's buffeting increased, he made his decision. He put his legs in the stirrups and pulled up the pre-ejection leg braces. Then he reached for the face curtain and pulled, triggering the catapult.

The next thing he knew, he was hurtling out of the plane at nearly 600 mph. He knew he had to free-fall for quite a distance to get out of the rarified atmosphere before freezing to death or dying from lack of oxygen. The rip cord was next on his mind, but he couldn't find it. At 15,000 feet, with the ground rushing up at him, he finally found the cord dangling over his side.

With great effort, he yanked the cord with all his might, and the chute opened, jerking him back a few feet. Lt. Fruin floated into a swampy inlet, a few miles from the ocean. He inflated the life raft attached to the chute and climbed in. He then used his hands to paddle to within 100 feet of the marshy ground and began calling for help.

Fortunately, his weak cries were heard by three boys in a row boat who came to his rescue. They pulled the aviator into their boat and brought him to shore where they had their horses tied. While two rode for help, the third remained with Fruin. A cattle rancher came to his aid and drove him to a hospital 22 miles away.

Besides making the first operational use of an ejection seat in the United States, Lt. Fruin — who later retired as a captain — may also hold the record for the longest free-fall.

SPECIAL BRAVO ZULU

Photo by PH3 Eddie Hickman

In addition to our normal Bravo Zulus, this month we give a special Bravo Zulu, not to a person but to a unique cookbook. It doesn't contain the usual recipes. It contains submissions from the various aviation safety officers and non-commissioned officers in the 2nd Marine Aircraft Wing. Credit for the origination of the concept belongs to Lt. Col. D.M. Hoffman, 2nd MAW, Director of Standardization and Safety. He is quick to shun any personal publicity however, preferring all credit be given to the contributors. Special mention should be made of the contribution of Maj. John Moeller, Royal Danish Air Force, whose artwork appears throughout the book. Readers will find that the cookbook includes a wide spectrum of safety-related topics including sample pre-mishap plans, safety stand-down suggestions, preformatted OPREP-3 diskettes and baby car seat safety. Don't be surprised if some of these end up in Approach!

This innovative approach promises to be a principal resource for all aviation safety officers. Approach salutes the 2nd MAW for a job well done.

Lt. Russ Knight (left),
LCdr. Mark Himler (right).

Lt. Russ Knight
LCdr. Mark Himler
VA 55

Shortly after takeoff from USS *Coral Sea* (CV 43) on deployment in the Mediterranean, Lt. Knight (pilot) and LCdr. Himler (B/N) noticed a momentary flicker of the right engine fire light. At first they weren't sure they had seen it. Then it flashed again. Lt. Knight secured the engine according to NATOPS and started dumping fuel while LCdr. Himler notified the ship. They began looking ahead to the landing by calculating their maximum landing weight, considering divert options and requesting permission to jettison their high drag stores. After consulting with a squadron rep and confirming gross weight, they performed a practice approach and wave-off. Lt. Knight then turned in and flew an OK pass, but the hook skipped the 3 wire (4 wire removed). A night single-engine bolter is a most challenging maneuver in the A-6. With an unreliable AOA due to right yaw, Lt. Knight quickly scanned nose attitude, VSI, ball and airspeed, to nurse the underpowered Intruder airborne. The LSO assured him he had done everything right and to do the same thing again. And that's exactly what he did, to an OK-2 wire.

With only five months experience in the fleet, Lt. Knight, with the calm, experienced assistance of LCdr. Himler, made a difficult emergency look routine under trying circumstances.

BRAVO ZULU

Lt. O. James Alexander
VFA 131

Lt. Alexander launched in an F/A-18 Hornet from the USS *Coral Sea* on a night combat air patrol mission. Immediately after the catapult shot, the master caution light and aural tone activated, and the aircraft failed to complete initial rotation. Upon initiation of back-stick, the aircraft pitched nose-up and entered a series of violent longitudinal oscillations. While attempting to regain control of his aircraft, Lt. Alexander observed the radar altimeter cycle through 120 feet six different times. By selecting afterburner and averaging out the oscillations, he established a climb. The left digital display flight path indicator noted that the stabilators had reverted to a back-up mechanical mode of operation. Lt. Alexander made two unsuccessful attempts to reset the flight controls back to the normal control augmentation system; the first at 2,500 feet and the second at 5,000 feet. After each reset attempt, the aircraft rapidly departed controlled flight with severe pitch and roll oscillations. Although faced with an imminent ejection situation, Lt. Alexander was able to regain control of the aircraft by setting and maintaining a constant aft stick position. Since the aircraft is not CV-recoverable with the stabilators in the mechanical mode, Lt. Alexander was diverted to NAS Cecil Field, where he executed a flawless straight-in approach to a short field arrestment.

Darken S

By Lt. Mark Burns

. . . Suddenly I'm face down in the catwalk. I can't move and have problems breathing. I he

0300 BRIEF. Oh well — it's my only hop of the day. A light schedule because we're fighting the OPTAR War even though we are two months into a Med cruise. A 0500 launch, couple of hours of SSC, and I will land at 0700, with plenty of time left in the day to write evals, complete my mission planning folder, and stand a few alerts and tower flowers. Just another typical JO day.

As I take the weight chit up to flight deck control, I notice it's darker than when I fell face down in my spaghetti vongole last time in Naples. No moon, no stars and no shipboard lights. In fact, I have trouble finding flight deck control. When I do, I'm told not to use my flashlight: We're at "Darken Ship," hiding from the simulated bad guys. Being a good JO, I say "No problem, can do easy." A quick check of the deck board reveals my jet is on the third spot on the bow. Why is it me that always has to taxi to that spot after landing at night and then has to preflight there on a black morning?

Stepping outside into the total darkness, I find a familiar shadowy figure with our squadron emblem on his cranial and follow him towards the bow. Unfortunately, I lose him halfway there. I can't believe how dark it is. He was only two steps in front of me.

Somehow I find my jet, feeling guilty every time I flick on my flashlight to see if I'm still on steel and hearing ominous voices yell, "Hey, cut the light, we're at Darken Ship!" I start my preflight, transferring to my red lens that illuminates only 1 square inch of Corsair, ensuring that it won't be me that gives our position away to the "enemy." Starboard av/bay looks OK, starboard wheel well checks good. I duck under the drop-tank on station 6, step over this tow bar that some clod left in the "middle of the deck," and . . . Whoaaa! If this isn't a

g.

Ship

I hear my plane captain calling, "I've lost my pilot! I've lost my pilot!"

nightmare, it's really going to hurt when I hit, whether it's water or steel. Slam! It's steel!

Suddenly, I'm face down in the catwalk. I can't move and have problems breathing. I hear my plane captain calling, "I've lost my pilot! I've lost my pilot!" but I'm unable to respond. They find me when I'm finally able to stand up and squeak, "I'm down here." My trusty PC and troubleshooters help me out of the catwalk, retrieve my helmet, which had flown off on impact, and try to convince me to go to sick bay. I feel OK now, a little shaken, and actually it's sort of nice to see stars (even if I'm the only one seeing them). I say, "No, I'm OK, just had the wind knocked out of me." Besides, it may be my last hop for a couple of days, and the flight schedule is tight with no one to spare.

So I finish my preflight, launch and start the mission. With the sun coming up and the hop halfway over, I was feeling pretty good until I tried to reset the radar altimeter. Wow! Who stuck the knife in my ribs? There was a pain in my left side which grew steadily worse all the way through the trap. One which I will certainly never forget.

After my OK 3 wire (I'm hurt, but I'm rolling into the groove anyway), I make the decision to go to sick bay. I figured it wasn't too good when the Doc looked at the X-rays, then looked at me incredulously and said, "You flew?" Hey, Doc, a trap's a trap! Diagnosis: four fractured ribs, a bruised kidney, and they're still looking for more damage.

As I lay in my sick bay bed, I had time to think over the events and what I would have done differently.

- NATO exercise: Important that I didn't give the ship's position away with my white flashlight. But I think I could have used a white flashlight and kept it pointed at the deck or at specific preflight items on my jet without jeopardizing the carrier's position.
- Was I the right person to make the decision that I was OK to fly? I honestly felt after the initial shock of the fall that I was OK, and just had the wind knocked out of me and could "hack it." And I did. However, the Doc said had I injured my spleen and then aggravated it on the cat shot, I could have "bled out" in 20 minutes. I was hesitant to ask him what that means, but it sort of sounds like fuel starvation without a low fuel light. We had a spare aircraft; a pilot briefed, manned and turning. Was I in any condition to make the decision I made? Is a night cat shot the place to do a test hop on my body? I feel most light attack aviators would have made the same decision I made. How many pilots have to suffer through a two-hour flight after that first JP-5 bath under a full drop-tank, before they learn to get it washed off before they fly? In my case, the post-flight injury report indicated perhaps I should have used the flight surgeon's expertise earlier.

- What if my aircraft had been parked on the first spot on the bow, instead of the third spot? If I had stepped off the bow, my fall may have been a lot further. Would they have found me? In this case, I think so because my plane captain, AN Carlos Armendariz, was paying attention, immediately realized something was wrong and took action to find me.

I am now grounded two to four weeks, missing out on the Turkish low-levels we've been planning and looking forward to a lot of SDOs. I'm already sick of TV in the ward and keep wondering what dreaded diseases the guys around me in sick bay have. I wonder if the Doc is ever going to let me eat a full meal. Next time, if safety of (pre) flight dictates, "Darken Ship" or no "Darken Ship," I'm going to use my white flashlight to ensure my feet are firmly planted on steel. ◄

Lt. Burns was flying the A-7E with VA 46 when this incident occurred. He has since joined VA 174 as an instructor.

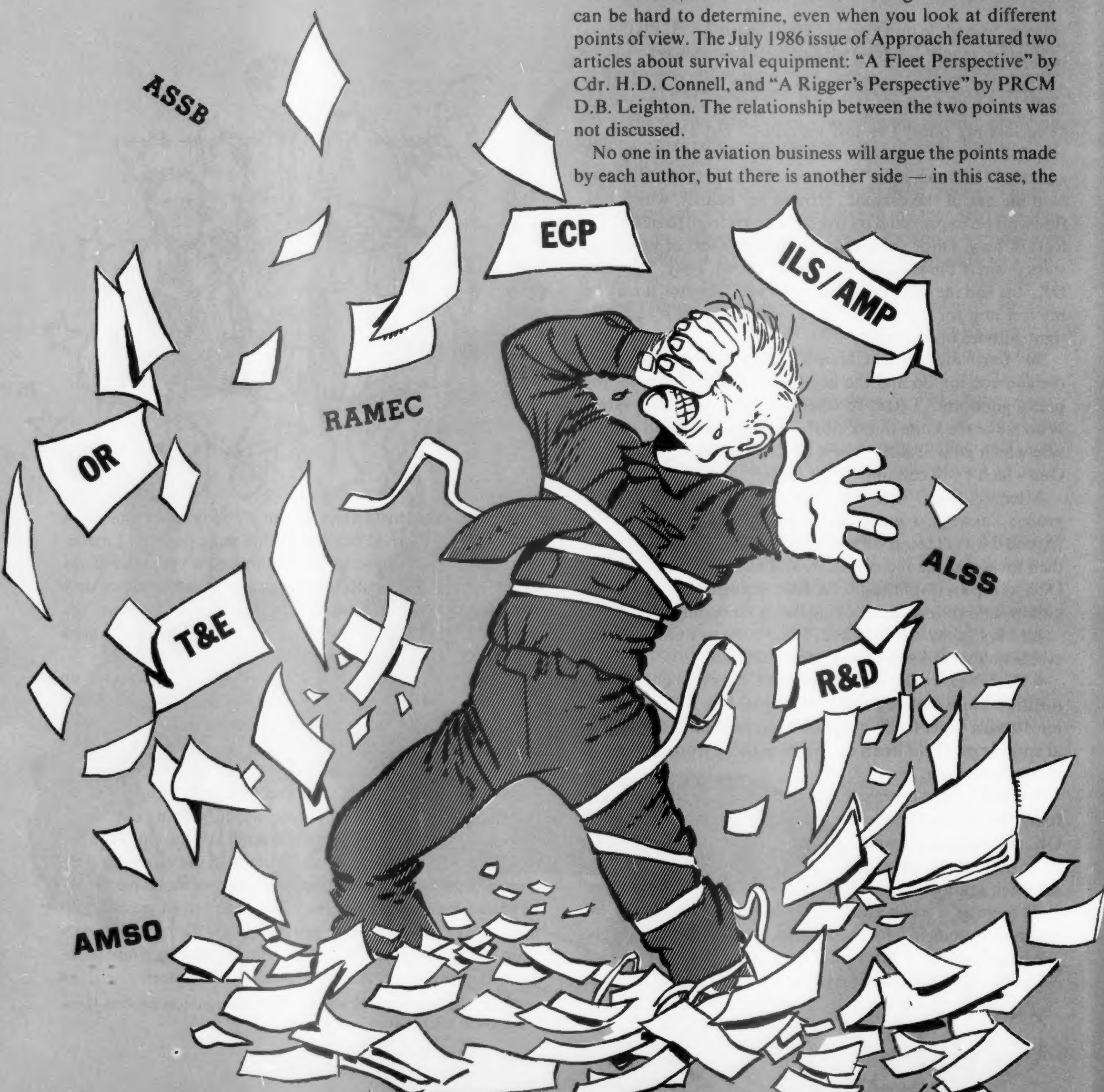
SURVIVAL EQUIPMENT:

The Total

By Lt. J.L. Clark

THE truth, the whole truth and nothing but the truth — it can be hard to determine, even when you look at different points of view. The July 1986 issue of Approach featured two articles about survival equipment: "A Fleet Perspective" by Cdr. H.D. Connell, and "A Rigger's Perspective" by PRCM D.B. Leighton. The relationship between the two points was not discussed.

No one in the aviation business will argue the points made by each author, but there is another side — in this case, the



Perspective

"middle" of the story. Cdr. Connell talks about the lack of communication between the equipment procurement offices, configuration managers and the fleet consumer. PRCM Leighton explains the evaluation process for new or modified equipment via the TYCOM who assigns a unit to conduct the evaluation. This is only one way that the fleet has an input to aviation life support systems (ALSS).

Cdr. Connell calls for establishing good rapport between aircrew and management, thereby improving modifications to meet hazards of specific operating environments. He defines the problem, but not the entire solution. Communication without understanding (based on education) or follow-up action is only conversation. Does the fleet really understand the total process of ALSS?

PRCM Leighton described many ways to correct problems with ALSS; however, these all concern fixing an existing problem. What starts the train for any item of ALSS? An operational requirement (OR).

The OR *originates* with the fleet and simply defines the requirement for an item of ALSS. The evaluation process examines the validity of the requirement and whether an existing item of ALSS will fill the bill. If the OR is valid, then it enters the budget cycle for funding, and engineers will begin a research and development (R&D) program.

If an existing item of ALSS will not meet the requirements, then the R&D program will be extensive. The item must be developed within all the configuration compatibility and safety specifications. If an existing item of ALSS would meet the requirements but must be modified, an engineering change proposal (ECP) or a rapid action minor equipment change (RAMEC) will be drafted to meet the specifics in the OR.

The ECP involves new equipment or components to modify the item of ALSS. Depending on the R&D program and the added test and evaluation (T&E) requirements, the ECP can take five to six years to reach the fleet. This span includes first article testing and supply lead time of approximately one year to stock the item for fleet draw-down.

The RAMEC involves using existing equipment or components (off the shelf items) to modify the item of ALSS. Usually the R&D program is minimal, but T&E requirements along with configuration and safety specifications are often equal to an ECP. Therefore, the time period depends on the extent of the change and ranges from 18 months to more than three years.

Now that we know how to proceed: How do we keep on the right track or remain mission specific? The "external force" usually begins with active communication and then progresses into affirmative action. When was the last time you, as a user, talked to your rigger on a professional basis, rather than complaining about the rigger's refusal to "illegally" modify your gear regardless of what the modification was?

Have you ever thought about submitting the modifications as a change to benefit everyone else? How many times have you heard "They don't really care what we want," or "That suggestion or idea was submitted years ago and we haven't seen anything on it yet," or "Don't waste your time, they don't care what we say; there're going to do what they want anyway."

One answer to these comments is that the fleet didn't communicate its desires to the powers that be in the ALSS business, or didn't use the proper mechanism for communication. Remember, the fleet must originate the OR. In the case of ORs or modification proposals, origination is generally at the squadron level. There are many vehicles with which the squadron can either address a problem with ALSS or propose a modification.

First, let's identify some lines of communication that will highlight or expose problem areas with ALSS. The Navy has a network of aeromedical safety officers (AMSO's) who act as the eyes and ears of the fleet for the NAVAIR sponsored Fleet Air Introduction Liaison Survival Aircrew Flight Equipment (FAILSAFE) program. How many of you ever heard of an AMSO? As field coordinators, they both transmit information about new or modified ALSS and receive inputs on all ALSS. When was the last time your squadron requested the local AMSO to speak on the current and upcoming issues concerning ALSS?

The AMSO submits a semiannual report to COMNAVAIRSYSCOM that includes fleet feedback on any item of ALSS. This means of communication is very effective in identifying problems with ALSS, but doesn't relieve the squadron of the responsibility to originate correspondence.

Another line of communication is through the Aircrew Survival and Safety Board (ASSB). The ASSB, composed of flag officers, provides OPNAV with a prioritized listing of specific ALSS projects or requirements which identifies the programs for budgetary planning. The fleet has direct input to the ASSB via the chain of command. COMNAVAIRSYSCOM is required to respond to ASSB guidance for ALSS

program planning.

The Integrated Logistic Support/Acquisition Management Panel (ILS/AMP) is composed of TYCOM representatives, respective cognizant field activity (CFA) representatives, the appropriate OPNAV sponsors and AIR 5311 (Crew Systems Branch). The ILS/AMP meets annually (April-May) to entertain fleet inputs for modifying ALSS. Once the forum accepts the proposal, the voting members prioritize each agenda item for funding in a manner similar to the risk assessment codes used in OPNAVINST 3750.6N. Have you ever heard of the ILS/AMP? It is surprising to see that each year the only wing-wearer members are the OPNAV sponsors AMSOs, and NAVAIR representatives.

Finally, the one line of communication, rarely used but frequently abused, is the squadron rigger. He is the first line contact in developing your desired change into the language and format necessary for submission. If you detect a problem with your aircraft, then maintenance control requires a VIDS/MAF. If its a flight equipment problem, then *you* should request an action form. Some of the action forms were described by PRCM Leighton.

Let's review the mechanisms to correct a functional problem. If the item doesn't work as advertised, or the product is faulty, a quality deficiency report (QDR) is required. Take the time to write a QDR on an item of ALSS, just as you do with a VIDS/MAF for the aircraft. Don't blame the rigger for the equipment not working. He didn't make it, nor did he have anything to do with the prototype. Once you have identified the problem, submit the QDR; then pass the word to other squadrons, the AMSO and your TYCOM rigger. Don't be satisfied with only one QDR per geographic area — there's strength in numbers.

In the case of a maintenance procedural problem with an item of ALSS, assist your rigger in submitting a Technical Publication Deficiency Report. Just because it's in the manual doesn't mean the procedure is always correct.

Another problem you and your rigger may face with items of ALSS is a non-responsive supply system. Again, don't blame your rigger — he's as much a victim of the system as you. Help him to apply the pressure where it belongs — on the supply system.

The RAMEC was previously discussed as an action resulting from an OR. A RAMEC can also be initiated by any squadron throughout the year, or brought to the ILS/AMP for discussion and submission. One additional comment about the RAMEC process: if you aren't sure your conceptual idea to improve the function of an item of ALSS will work, then you may want to test it to save yourself time and the taxpayers' money. Simply contact your local AMSO in cooperation with your rigger to obtain permission to test and evaluate your idea (using one item of ALSS as defined by OPNAVINST 4790.2C).

If your squadron is selected to be the evaluator for a change, as PRCM Leighton described, then be objective. Take the time to examine the item. Will it meet the needs of the fleet in the operational environment as was intended? Most important, talk to your rigger about how it will be maintained and serviced.

The statement "The user must tell the supplier what he wants and what he doesn't like about existing gear before the supplier can correctly respond" is very true. But the user must know who the "supplier" is, what to tell him, how to tell him and who else needs to know.

Our job, now that we understand the system, is to make it work by using it. If we discover that the system is wrong, let's fix it.

Lt. Clark is the Aeromedical Safety Officer for MAG 31 at MCAS Beaufort, S.C.

Look, Ma! No Hands!

By Cdr. Bert Polk

. . . No cuts and no burns beats no hands any day . . .

One of the more recent good deals for jet jocks is called SEAWARS — not to be confused with STARWARS. SEAWARS (Seawater Activated Release System) takes some of the worry out of getting wet. It automatically releases the parachute from an ill-fated airman as soon as he plops into the drink. No more struggling with Koch fittings while wind-surfing through heavy seas.

Going hand-in-glove with SEAWARS is the fairly recent FLU-8. This updated LPA is fitted with a device that reacts to salt water, producing a satisfying rush of cool, refreshing CO_2 that fills the life preserver and automatically buoy's the aviator.

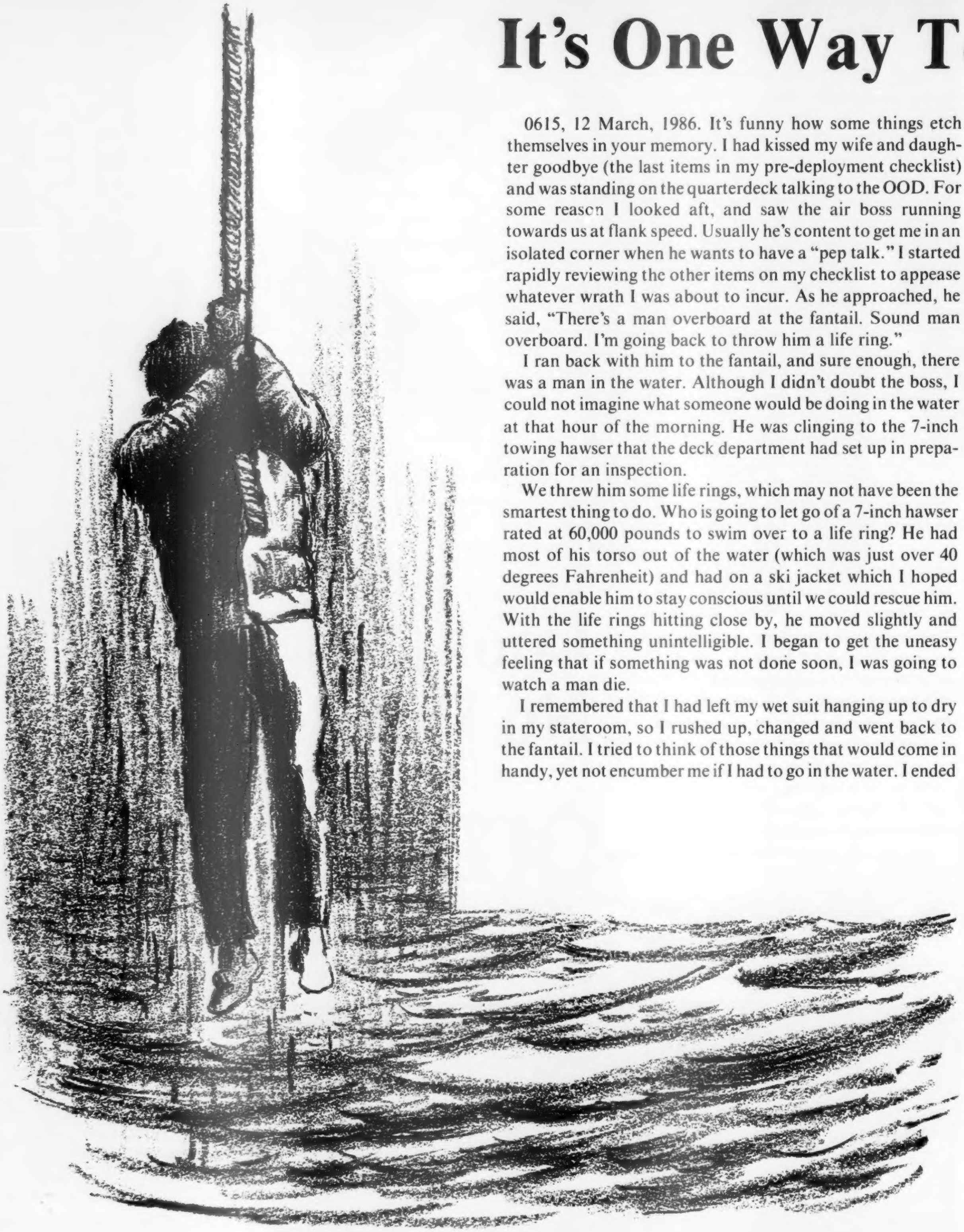
These two modifications are now in use by the majority of naval aviators. A word of caution to "hitchhikers": In some types of aircraft their use is prohibited. An example is the mighty Hummer. Automatically-actuated flotation gear is hazardous in the E-2C because of the ever-present possibility of ditching. The last thing you want is your LPA inflating before you exit the ditched aircraft. If you are thumbing a ride in somebody else's aircraft, be sure your equipment is compatible, and get a thorough checkout on any loaner gear.

Another recent entry into aviation safety is the Stencel ejection seat. This jewel is currently used by A-7 and AV-8 drivers, and has numerous features which effectively pull a pilot out of harm's way. Unfortunately, there are a few hazards that come with the improved seat, with which aircrews must become familiar. One of these received comments in a recent Safety Center wrap-up to a mishap report. The mishap pilot's hands were severely injured when he ejected without gloves. "As the Stencel seat goes through the canopy, it breaks the canopy more effectively than the original Escapac ejection seat. The inherent problems associated with canopy penetration in the Stencel seat warrant the use of gloves at all times. As SEAWARS is implemented, the use of gloves during all flights becomes more prudent."

We have lots of great equipment. When it is time to fly, the wise aviator puts his or her gloves on and leaves them on from preflight through postflight. No cuts and no burns beats no hands any day.

Cdr. Polk is safety officer on USS *Midway* (CV 41).

It's One Way To S



0615, 12 March, 1986. It's funny how some things etch themselves in your memory. I had kissed my wife and daughter goodbye (the last items in my pre-deployment checklist) and was standing on the quarterdeck talking to the OOD. For some reason I looked aft, and saw the air boss running towards us at flank speed. Usually he's content to get me in an isolated corner when he wants to have a "pep talk." I started rapidly reviewing the other items on my checklist to appease whatever wrath I was about to incur. As he approached, he said, "There's a man overboard at the fantail. Sound man overboard. I'm going back to throw him a life ring."

I ran back with him to the fantail, and sure enough, there was a man in the water. Although I didn't doubt the boss, I could not imagine what someone would be doing in the water at that hour of the morning. He was clinging to the 7-inch towing hawser that the deck department had set up in preparation for an inspection.

We threw him some life rings, which may not have been the smartest thing to do. Who is going to let go of a 7-inch hawser rated at 60,000 pounds to swim over to a life ring? He had most of his torso out of the water (which was just over 40 degrees Fahrenheit) and had on a ski jacket which I hoped would enable him to stay conscious until we could rescue him. With the life rings hitting close by, he moved slightly and uttered something unintelligible. I began to get the uneasy feeling that if something was not done soon, I was going to watch a man die.

I remembered that I had left my wet suit hanging up to dry in my stateroom, so I rushed up, changed and went back to the fantail. I tried to think of those things that would come in handy, yet not encumber me if I had to go in the water. I ended

... Start Your Day

By Lt. Colin Claus

up wearing my two-piece wet suit, flight boots and a ski cap. I've swum in a wet suit, so I was not concerned with flotation and opted not to put on my LPA. This proved to be a good idea because I later floated chest high and had excellent mobility.

When I arrived back at the fantail, there were quite a few people gathered about but none prepared to go in the water. I worked my way to the edge, and was glad to see that a Jacob's ladder had been rigged — the prospect of jumping approximately 20 feet into the water did not appeal to me. The ladder stopped 2 feet short of the water, so upon reaching the bottom, I dangled momentarily, then slid into the water. Aside from the sensation of being wet, I did not find the water as cold as I had anticipated and vowed to wear the wet suit even beyond the NATOPS recommendations in the future.

When I reached the victim, his face and neck were red, but his eyes were clear. I asked him the obvious question, "How ya doing?" He said he was OK, but he felt cold. Although I did not think it would make a difference for the short amount of time that I expected us to be in the water, I had him curl his legs up to approximate the **HELP** position.

At one point I tried unsuccessfully to take his pulse, which served to keep his interest up. I still do not know if I interpreted the information correctly, but I blamed most of it on my lack of formal training and his obesity. Fearing the worst, I thought he was going into shock so I yelled up that I needed a horse collar fast. He started to shake, and in broken speech, complained of being very cold. As a last resort, I took off my ski cap and put it on him. He was most appreciative and said that it felt good. Even though his voice was only a little shaky, I estimated that based on the way he was deteriorating, he had only about five minutes of consciousness left.

The people on deck lowered a 2-inch nylon line. I shouted for some slack and proceeded to rig him for rescue. I was disappointed that they didn't lower me a horse collar, but when I tried to slip the line under his right arm, I was glad I had the small line. He was bear-hugging the hawser so hard that when they pulled him up, he held on until he reached the top. They had to pry him apart from it. I was pleased that I had routed it under both his arms, but then I was faced with having to tie a knot that would hold him all the way to the top.

Knowing next to nothing about knots, I was concerned that he would get most of the way up and then fall. I knew if he fell there would be no way to save him. So I ended up tying a slip knot. I assumed that he would go up like a log and that the self-tightening feature would keep him from falling through. I doubled the knot for added security.

I gave the folks on the flight deck the go-ahead, and away he went. He was up about 7 feet when one of the life rings with the signal lamp fell and just missed my head. **Lesson 1:** Should you ever rescue someone and not go up with them, stay clear when they start to go up. If I had been knocked unconscious without self-righting flotation on, it would have been a whole new story.

I breathed a deep sigh of relief when I finally saw him get pulled over the edge. Now it was my turn, and as I mentioned, the Jacob's ladder did not meet the water. I had read in *Approach* that your hands are the first to go, and within 10 minutes they can become useless for anything other than waving. **Lesson 2:** They were not kidding. I went to grab the ladder and found I had two lobster claws where my hands used to be. If I had been trying to unzip a pouch to get a signaling device, I doubt that I would have been able to do so. Even if I had a signaling device, operating it would have been difficult.

My strength was starting to ebb, and I felt it would be best to get out of the water. I mustered up a last surge and dragged myself up on to the ladder and started to climb up. The wet suit was heavier than I anticipated, and the way the Jacob's ladder moved out from under me made it very difficult; I finally just clung to it.

Having rushed the rescuee off of the ship, they redirected their attention to me and lowered a horse collar. Ahh! I slipped it on and even remembered to fold my arms and then felt myself being pulled up. Fortunately, two of the larger members of ship's company were there to greet me, and I heard one of them say, "I've got him." The next thing I knew I was over the fantail and lying down on the deck. Aside from the fact that my hands were beet red and hurt considerably, I was OK.

A chief told me later that I spent 12 minutes in the water and, except for my hands, I am confident I could have been in the water considerably longer without too much detriment. Considering the fact that I normally get cold in swimming pools, this is a significant testimony to the efficiency of a wet suit.

I later learned that the rescuee's core temperature was 93 degrees Fahrenheit when they took him to the clinic. He was subsequently air-lifted to the regional hospital. That afternoon I gave a statement to his division officer and learned he was a second class petty officer from an aircraft carrier. Apparently he had gone on liberty, had a few too many and was making his way back to the ship. He got past the pier sentry, who radioed the quarterdeck, and was not seen until he was discovered by the air boss. Like I said, it's one way to start your day.

Lt. Claus is hangar deck officer on the USS *Inchon* (LPH 12). A helicopter pilot, he flew with HC 6, NAS Norfolk, Va., and was a helo instructor with HT 18, NAS Whiting Field, Fla. He has an MBA degree from the University of West Florida.

FAILSAFE and You

Submitted by the Aviation Physiology Training Unit, NAS Norfolk, Va.

FAILSAFE: Fleet Air Introduction Liaison Survival Aviation Flight Equipment Program. The title of this COMNAVAIRSYSCOM-sponsored program is complicated, but the goal is simple and straightforward: to increase aircrew survivability. The program was originally developed as a training system for aviation life support systems (ALSS). FAILSAFE has since expanded to a major, user-oriented program offering all aspects of survival equipment. It has three basic parts:

Introduction. FAILSAFE is designed to ensure that aircrews receive concurrent indoctrination in the use of new or modified ALSS. It also ensures that indoctrination is provided for the people who install and maintain the equipment.

The program provides technical data indoctrination packages (TDIPs) tailored to individual communities. The packages are distributed to squadron or unit spaces when new or modified ALSS arrive. The Navy's aerospace physiologists, together with aircrew survival equipment men (PRs) and aviation physiology technicians, present these introductory packages to the fleet. Some elements of the TDIPs may later become part of recurrent aviation physiology and water survival training curricula.

Over the past few years, many equipment changes have been introduced to fleet activities under this program. Some examples include the parachute four-line release system, beaded inflation handles for life vests, the HGU-33/34 series helmet, modification to the SPH-3 series helmet, CWU-62/P anti-exposure suit and SEAWARS and FLU-8 technology. New packages are developed as new equipment becomes available to the fleet. Physiologists assigned to aviation physiology training units (APTUs) or operationally assigned to senior line commands as aeromedical safety officers (AMSOs) have copies of the past and current packages; they can ensure that your command has the latest information.

Monitoring. A second aspect of the program is to monitor the installation and incorporation of new or modified ALSS by the user communities. Again, local APTU and AMSO personnel are available to assist in fitting, sizing and integrating of the equipment. They can help evaluate and document ALSS equipment problems and facilitate proposed fixes.

FAILSAFE regional coordinators located at APTD Miramar, APTD Corpus Christi and APTD Norfolk maintain FAILSAFE "Tiger Teams" composed of senior aircrew survival equipmentmen to provide support for the incorporation of new items into the squadrons.

Feedback. The third and most critical part of FAILSAFE is squadron feedback. APTU and AMSO personnel maintain direct, albeit informal, lines of communication with NAVAIR, TYCOMS and cognizant field activities (CFAs) in matters relating to ALSS and survival equipment. Some senior line commands maintain standing committees to address problems with ALSS. At other activites, the APTUs and AMSOs work directly with the squadrons to answer questions and receive feedback. This information is submitted by each APTU and AMSO site in semiannual FAILSAFE reports to COMNAVAIRSYSCOM, so that cognizant project managers and field engineers can be tasked with taking appropriate action to resolve fleet problems.

FAILSAFE is an integral part of the overall effort to improve ALSS and to increase aircrew survivability because it operates at the squadron level. It works, as the commercial says, "where the rubber meets the road."

For additional FAILSAFE information or assistance, contact your local AMSO or APTU. The program will be as effective as you choose to make it.

FAILSAFE Points of Contact:

☐ East Coast Region

Coordinator:	Cdr. D. Kelley, MSC, USN
Tiger Team:	PRCM R. James, USN
	PRC J. Janousek, USN

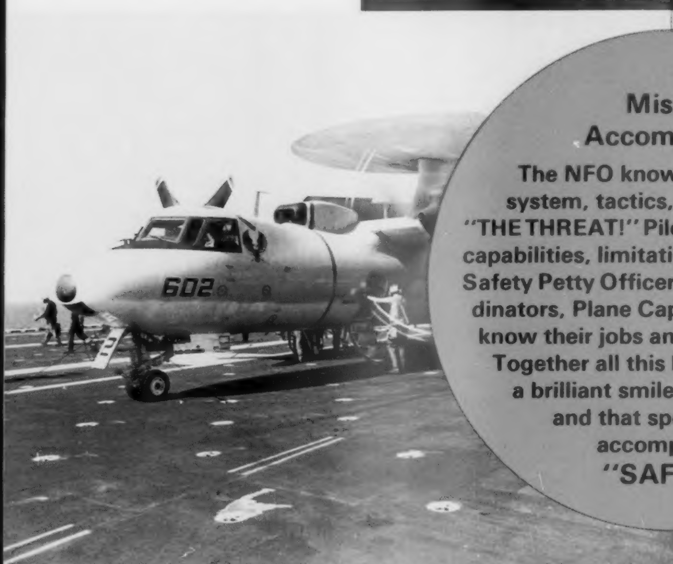
Autovon 564-3083

☐ West Coast Region:

Coordinator:	Cdr. J. Patee, MSC, USN
Tiger Team:	PRCS P. Powers, USN
	PRC D. Shuster, USN

Autovon 959-2101

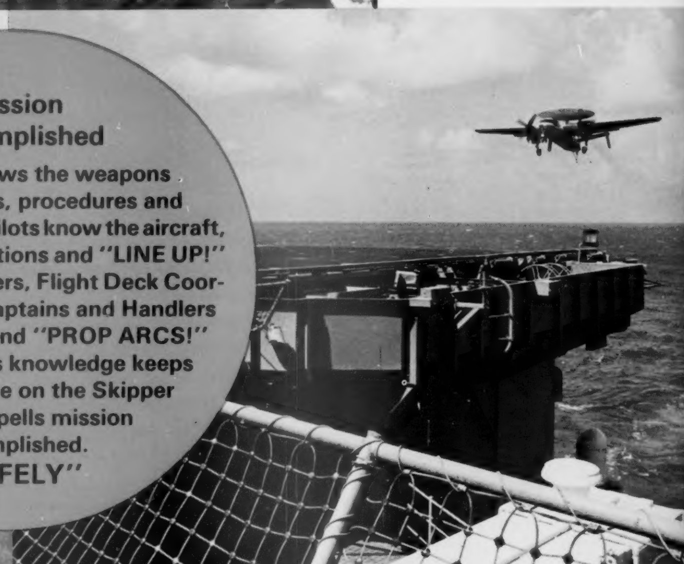
Speaking of hang-ups . . .
This bundle cost a flight.



Mission Accomplished

The NFO knows the weapons system, tactics, procedures and "THE THREAT!" Pilots know the aircraft, capabilities, limitations and "LINE UP!" Safety Petty Officers, Flight Deck Coordinators, Plane Captains and Handlers know their jobs and "PROP ARCS!" Together all this knowledge keeps a brilliant smile on the Skipper and that spells mission accomplished.

"SAFELY"



Text and photographs by Lt Steven L. Ogles, ASO, LSO, VAW 113, USS *Constellation* (CV 64)